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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/595,660	05/03/2006	Yuichiro Shindo	OGOSH53USA	4264
270 7590 10/13/2009 HOWSON & HOWSON LLP 501 OFFICE CENTER DRIVE SUITE 210 FORT WASHINGTON, PA 19034			EXAMINER ROE, JESSEE RANDALL	
			ART UNIT 1793	PAPER NUMBER
			NOTIFICATION DATE 10/13/2009	DELIVERY MODE ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@howsonandhowson.com

### Office Action Summary

**Application No.**

10/595,660

**Applicant(s)**

SHINDO, YUICHIRO

**Examiner**

Jessee Roe

**Art Unit**

1793

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 03 August 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,2 and 7-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-2 and 7-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)
- \_\_\_\_\_ Paper No(s)/Mail Date \_\_\_\_\_

- 4) ☐ Interview Summary (PTO-413)
- \_\_\_\_\_ Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3 August 2009 has been entered.

### ***Status of the Claims***

Claims 1-2 and 7-19 are pending wherein claims 8, 13, 15 and 17 are amended and claims 3-6 are canceled.

### ***Status of Previous Objections***

The previous objection to claim 15 because of informalities is withdrawn in view of the Applicant's amendment to claim 15.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 7-8 and 12-19 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In regards to claims 7, 12 and 16, the specification does not provide support for the range in the recitation "wherein said high purity hafnium of said sputtering target has a residual resistance ratio of at least 120".

In regards to claims 8, 13 and 17, the specification does not provide support for the range in the recitation "wherein said high purity hafnium of said sputtering target has a residual resistance ratio of 120 to 200".

. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 7 and 12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In regards to claims 7 and 12, the upper limit of the resistance ratio is unclear and undefined by the recitation "wherein said high purity hafnium has a residual resistance ratio of at least 120".

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-2 and 7-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shindo (US 2003/0062261).

In regards to claims 1-2 and 11, Shindo ('261) discloses a high purity hafnium metal with minimal impurities (abstract). Shindo ('261) discloses (Example 2) forming a 4N (99.99%) purity level hafnium metal excluding gas components such as carbon, oxygen, and nitrogen [0133]. Oxygen and carbon would be present at levels less than 500 ppm and forming a sputtering target or thin film and zirconium would be present at levels of 0.5 weight percent or less ([0064] and claim 7).

The Examiner notes that the composition disclosed by Shindo ('261) overlaps the composition of the instant invention, which is prima facie evidence of obviousness. MPEP 2144.05 I. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected the claimed amount of gas components such as oxygen, carbon, and nitrogen from the amounts disclosed by Shindo ('261) because Shindo ('261) discloses the same utility throughout the disclosed ranges.

With respect to the recitation "a sulfur content of 10wtppm or less, a phosphorus content of 10wtppm or less, and a zirconium content of 0.1wt% or

less" as in claims 1-2, the Examiner notes that purer forms of known products may be patentable, but the mere purity of a product alone does not render the product unobvious. MPEP 2144.04 (VII).

With respect to the amended transitional term "consisting" in claim 2, the Examiner notes that the products disclosed by Shindo ('261) does not require elements in addition to hafnium. Therefore, Shindo ('261) meets the claim.

With respect to the recitations "wherein said high purity hafnium of said sputtering target has a residual resistance ratio of at least 120" of claims 7, 12 and 16, "wherein said high purity hafnium of said sputtering target has a residual resistance ratio of 120 to 200" of claims 8, 13 and 17, and "wherein said oxygen content is 10wtppm or less" of claims 9, 14 and 18, Shindo ('261) discloses that oxygen would be reduced to 500 ppm or less [0064]. Therefore the recited residual resistance ratio would be expected. MPEP 2112.01 I.

With respect to the recitation "wherein said sputtering target has a body produced by subjecting a hafnium raw material to electron beam melting to form a hafnium ingot, subjecting the ingot to deoxidation with molten salt, and forming a sputtering target from the ingot after said deoxidation" of claim 10, the Examiner notes that the claims are drawn to a product and not a process. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior

product was made by a different process.

With respect to the recitation "wherein said thin film a sputtered thin film produced by subjecting a hafnium raw material to electron beam melting to form a hafnium ingot, subjecting the ingot to deoxidation with molten salt, forming a sputtering target from the ingot after said deoxidation, and depositing said thin film on the substrate by performing sputtering with the sputtering target" of claim 15, the Examiner notes that the claims are drawn to a product and not a process. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.

With respect to the recitation "wherein said high purity hafnium is produced by subjecting a hafnium raw material to electron beam melting to form a hafnium ingot and subjecting the ingot to deoxidation with molten salt" as in claim 19, the Examiner notes that the claims are drawn to a product and not a process. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.

Claims 1-2, 7-10 and 16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over the ASM Handbook Volume 2.

In regards to claims 1-2, the ASM Handbook Volume 2 discloses (pg. 1094, col. 2) purifying metals such as hafnium to a purity approaching 99.999% by chemical vapor deposition when a low-iron starting material would be used. The ASM Handbook further discloses that if the proper temperature is maintained, oxygen, nitrogen, hydrogen, carbon, and other typical metal impurities would not be carried over.

The Examiner notes that the purity of the hafnium disclosed by the ASM Handbook Volume 2 overlaps the purity of the instant invention, which is prima facie evidence of obviousness. MPEP 2144.05 I. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected the claimed hafnium purity from the hafnium purity disclosed by the ASM Handbook Volume 2 because the ASM Handbook Volume 2 discloses the same utility throughout the disclosed range.

With respect to the recitation "A sputtering target or thin film, comprising a sputtering target or thin film formed of high purity hafnium", the Examiner notes that although the ASM Handbook Volume 2 does not specify the size of the hafnium metal, "a sputtering target or thin film" is not defined to exclude any specific size or shape of metal. Furthermore, changing the size/proportion of the hafnium metal would not patentably distinguish over the prior art. MPEP 2144.04 (IV).



With respect to the amended transitional term "consisting" in claim 2, the Examiner notes that the ASM Handbook Volume 2 does not require elements in addition to hafnium. Therefore, the ASM Handbook Volume 2 meets the claim.

With respect to the recitations "wherein said high purity hafnium of said sputtering target has a residual resistance ratio of at least 120" of claims 7 and 16, "wherein said high purity hafnium of said sputtering target has a residual resistance ratio of 120 to 200" of claims 8 and 17, and "wherein said oxygen content is 10wtppm or less" of claims 9 and 18, the ASM Handbook Volume 2 discloses (pg. 1094, col. 2) discloses that oxygen would not be carried over. Therefore the recited residual resistance ratio would be expected. MPEP 2112.01 I.

With respect to the recitation "wherein said sputtering target has a body produced by subjecting a hafnium raw material to electron beam melting to form a hafnium ingot, subjecting the ingot to deoxidation with molten salt, and forming a sputtering target from the ingot after said deoxidation" of claim 10, the Examiner notes that the claims are drawn to a product and not a process. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.

With respect to the recitation "wherein said high purity hafnium is produced by subjecting a hafnium raw material to electron beam melting to form a hafnium ingot and

subjecting the ingot to deoxidation with molten salt" as in claim 19, the Examiner notes that the claims are drawn to a product and not a process. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.

### ***Response to Arguments***

Applicant's arguments filed 3 August 2009 have been fully considered but they are not persuasive.

First, the Applicant primarily argues that the unmet need at the time of the invention for hafnium materials having a high residual resistance ratio, which Applicant points out is discussed at lines 1-4 of page 3, lines 19-21 of page 4 and line 33 of page 5 to line 2 of page 6 and points to Examples 1 to 3 at lines 4-9 of page 9 where the residual resistance ratio values for Examples 1 to 3 are 200, 120 and 190 and argues that resistance ratio values of 200, 120 and 190 are considered high.

In response, the Examiner is not contending whether or not residual resistance ratio values of 200, 120, and 190 are considered to be high. The Examiner is contending that there is inadequate support for the claimed ranges of "a residual resistance ratio of at least 120" and "a residual resistance ratio of 120 to 200" and this position is based on the lack of support for the ranges as claimed.

Second, the Applicant primarily argues that there is nothing indefinite about a limitation requiring "at least 120" because the limitation particularly points out and distinctly requires a hafnium material having a residual resistance ratio of at least 120. Thus, a hafnium material having a residual resistance ratio of 120 or more is covered by the claim and a hafnium material having a residual resistance ratio of less than 120 is not covered by the claim. The Applicant further argues that the absence of an upper limit does not render such a mathematical limitation indefinite because if a hafnium material has a residual resistance of 120 or more then the limitation is met and if a hafnium material has a residual resistance of less than 120 then the limitation is not met.

In response, the Examiner notes that in the claims, the Applicant is to particularly point out and distinctly claim the subject matter which the applicant regards as his invention. Since Applicant has not distinctly assigned an upper limit to "a residual resistance ratio of at least 120", the claims having this recitation are therefore indefinite.

Third, the Applicant primarily argues that a proper interpretation of the "content of impurities" in the hafnium material is less than 100 ppm in Shindo ('261). However, this specifically excludes zirconium and gas components from consideration as impurities. Thus, the claim does not disclose that oxygen would be present at levels of less than 100 ppm, but rather discloses that oxygen is excluded from the purity determination. The Applicant further argues that Shindo ('261) teaches one of ordinary skill in the art that a large quantity of zirconium is contained in hafnium, that the separation and refinement between the two is difficult, and that the presence of zirconium "may be

disregarded since the purpose of use of the respective materials will not hinder overall purpose thereof".

In response, Shindo ('261) discloses that the content of gas components such as oxygen and carbon is 500 ppm or less [0064]. Although it may be difficult to reduce the amount of zirconium in high purity hafnium, Shindo ('261) reduces it to 0.5 weight percent or less [0065]. Additionally, forming purer forms of known products may be patentable, but the mere purity of a product alone does not render the product unobvious. MPEP 2144.04 (VII).

Fourth, the Applicant primarily argues that electron beam melting is described in Shindo ('261), but only requires the oxygen content to be at a level of about 500wtppm. The Applicant further argues that the oxygen content is not considered to be overly important in Shindo ('261); one Example shows the oxygen content to be 120 wtppm after electron beam furnace melting and another Example does not even bother to list oxygen. The Applicant further argues that the present application discloses the use of electron beam melting followed by deoxidation treatment with molten salt to produce a hafnium material wherein the oxygen content in Examples 1, 2 and 3 are less than 10wtppm, 20wtppm, and less than 10wtppm.

In response, the Examiner notes that in Example 2 of Shindo ('261), since the content of oxygen is not provided, but the content of other impurities such as phosphorus and sulfur are present (See Table 4) and zirconium is present at 2400 ppm, it can be assumed that oxygen is not present in the final product. Oxygen was present (500 ppm) in the hafnium sponge starting material (See Table 3). The amount of oxygen

present in the final product would depend upon how much oxygen is present in the starting material. Further, the Examiner notes that claims are drawn to a product and not a process. MPEP 2113.

Fifth, the Applicant primarily argues that the requirement of oxygen content being 40 ppm or less as required by the claims of the present application is critical and provides unexpected result relative to the teachings provided to one of ordinary skill in the art by Shindo ('261).

In response, the Examiner notes that Shindo ('261) discloses that the content of gas components such as oxygen and carbon is 500 ppm or less [0064]. To establish unexpected results over a claimed range, applicants should compare a sufficient number of tests both inside and outside the claimed range to show the criticality of the claimed range. MPEP 716.02(d)(II). The Applicant has not provided data showing the criticality of the 40 ppm or less of oxygen limitation.

Sixth, the Applicant points to the second and third paragraphs of the section of the ASM Handbook titled "Chemical Vapor Deposition" column 2 through column 3 of page 1094 which read:

"One of the more popular of the chemical vapor deposition processes is the iodide process, which has been used extensively to purify titanium, zirconium, and chromium".  
and

"Chromium has been purified to its highest state to date by this method. Only iron is carried over with these metals to a significant extent. Thus, if a low-iron starting metal is used, the condensed vapor will approach a purity of 99.999%."

and argues that the "approach a purity level of 99.999%" statement of the reference

refers specifically to chromium, not hafnium and the only metals that could possibly be included in "these metals" are titanium, zirconium and chromium which are the subject of this particular paragraph. This statement is not made with respect to hafnium and it is simply unfair to misread this statement otherwise.

In response, the Examiner notes that hafnium would be a low-iron starting metal and thus purification of hafnium via chemical vapor deposition would provide a purity level of 99.999% and with careful temperature control the oxygen, nitrogen, hydrogen, carbon and most metallic impurities will not be included in the purified hafnium.

Seventh, the Applicant primarily argues that Tables 1 to 3 of the "Chemical Vapor Deposition" section of the ASM Handbook do not include hafnium within the metal samples produced and tested, Table 2 (pg. 1096) lists hafnium only as an "impurity element" within other metal samples, and Table 2 identifies a purified zirconium sample having 200 ppm by weight of oxygen content.

In response, although the Tables in the "Chemical Vapor Deposition" section of the ASM Handbook do not include hafnium, disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or non-preferred embodiments. MPEP 2123 II. Additionally, although the Examiner acknowledges that the zirconium in Table 2 has 200 ppm by weight oxygen, the zirconium in Table 2 was not purified by chemical vapor deposition, but chemical vapor deposition was used to purify chromium according to Table 2 wherein the oxygen content is less than 10 ppm. Since hafnium would be a low-iron starting metal and thus purification of hafnium via chemical vapor deposition would provide a purity

level of 99.999% and with careful temperature control the oxygen, nitrogen, hydrogen, carbon and most metallic impurities will not be included in the purified hafnium.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jessee Roe whose telephone number is (571)272-5938. The examiner can normally be reached on Monday-Thursday and alternate Fridays 7:00 AM - 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V. King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Unit 1793

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